

Topology and Data

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We will give a short overview of concepts and methods from topological data analysis (TDA) that are used in the analysis of different types of datasets. A dataset is typically presented as a point cloud, that is, a finite set of points in some euclidean space of possibly high dimension. The underlying idea of TDA is that the shape of the point cloud provides useful insight into the properties of the data. Shape is described and analysed using the mathematical framework of algebraic topology. The main tool used in TDA (as well as the main contribution of TDA to the field of algebraic topology) is persistent homology. Persistent homology allows analysing the data at varying resolutions, and at the same time provides a clear and intuitive description of its shape.

Keywords. topological data analysis, algebraic topology .